



PATENT
Docket No. FBR06132P0010US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of:)	A Distributed Stereo System
)	
Leonard Colin Andrews and)	
Andrew Chartres Goldfinch)	Group Art Unit: 2615
)	
Serial No.: 09/485,657)	
)	
Filed: March 24, 2000)	Examiner: Justin I. Michalski

**DECLARATION OF ANDREW CHARTRES GOLDFINCH & LEONARD COLIN
ANDREWS UNDER 37 CFR 1.131**

Andrew Chartres Goldfinch and Leonard Colin Andrews declare as follows:

1. We are the co-inventors of a distributed stereo system as covered by the various claims in the above-referenced United States patent application.
2. At a time before 29 May 1997 Andrew Goldfinch conceived the basic idea of the invention to use Category 5 four pair twisted cable to carry audio signals and system power from a power supply and source in one room to amplifiers and speakers in another room.
3. Subsequently Andrew Goldfinch conferred with Leonard Andrews to develop, implement and fully realize the concept. A simple vero board used for an in- wall amplifier was adapted for preliminary testing of the concept. A true photograph of this board which we still hold is attached as Exhibit "A". Our concept was documented and a true copy of the original drawing extracted from Leonard Andrews' working notes is attached as Exhibit "B".
4. After preliminary testing, a working model connected to power supply and audio source was manufactured in-house, mounted in a light switch housing and installed in the

company's general office. Attached to this declaration as Exhibit "C" and "D" respectively are true photographs of the actual working model of the complete system as reflected by the patent claims, showing the system with and without the face plate. LeisureTech has retained the original system but have connected it to a new CD/DVD player and speakers for the purpose of this photograph. Attached to this declaration as Exhibit "E" is a true photograph showing the workings of the wall mounted prototype.

5. Subsequent to that an actual working model of our distributed audio system embodying our patent claims was enclosed entirely in a wooden box so that none of its workings or cables were visible and was demonstrated to industry members at our company stand at the CEDIA Expo held in Sydney Australia on 9 February 1997. We attach to this declaration as Exhibit "F" a true photograph of the wall amplifier component of the system placed into the wooden box to preserve its secrecy. The demonstration of this system to our peers allowed us to verify that the sound quality it produced was at a level acceptable to the discerning local audio market. We have searched our records but have been unable to locate any photographs of our company stand from that trade show. On our stand at that trade show we had a flyer of our "Development Program 1997" that included the "PM-20 Power Mate" which is a product embodying the technology protected by this patent application and which we re-named "A-BUS" prior to its market launch. Attached to this declaration as Exhibit "G" is a true copy of the flyer that was available from our stand at that trade fair.

6. Thereafter we met with our lawyer Jacqui Israel and patent attorney Chris O'Sullivan and at a meeting on 7 March 1997 an actual prototype showing all workings and cabling was shown to our lawyer and patent attorney to begin the patent process. Photographs taken by Leonard Andrews of the prototype shown to our lawyer and patent attorney are attached to this declaration as Exhibits "H", "I", "J" and "K" respectively.

7. All of the above activities occurred prior to 29 May 1997.

All statements which we have made in this Declaration of our own knowledge are true, and all statements which we have made in this Declaration on information and belief are believed to be true. We have also been warned that willful false statements and the like are punishable by fine or imprisonment, or both under §1001 of Title 18 of the United States Code and may jeopardize the validity of this application or any patent issuing thereon.

Date: 10 - August 2006



Andrew Goldfinch

Date: 10 - AUG - 2006



Leonard Andrews



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Filed: March 24, 2000)	

DECLARATION OF CHRIS O'SULLIVAN UNDER 37 CFR 1.131

Chris O'Sullivan declares as follows:

1. I am a registered patent attorney of more than 20 years experience and a partner in the firm of FB Rice & Co Patent Attorneys in Sydney Australia. I am the principal patent attorney for the applicants who are also based in Sydney.

2. At a meeting at my office with the applicants and their legal counsel Jacqui Israel, the applicants exhibited to me the production prototype of their wall amplifier and showed how it fitted into a light switch housing and explained to me and Ms Israel how it was hooked up with sound system components using category 5 cable to make their distributed stereo system embodied in the patent application. My records verify that this meeting occurred on 7 March 1997.

All statements which I have made in this Declaration of my own knowledge are true, and all statements which I have made in this Declaration on information and belief are believed to be true. I have also been warned that willful false statements and the like are punishable by fine or imprisonment, or both under §1001 of Title 18 of the United States Code and may jeopardize the validity of this application or any patent issuing thereon.

Date: 31 July 2006

Chris O'Sullivan

Chris O'Sullivan



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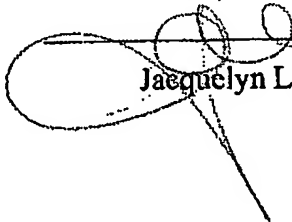
DECLARATION OF JACQUELYN LEE ISRAEL UNDER 37 CFR 1.131

Jacquelyn Lee Israel declares as follows:

1. I am an attorney certified to practice law in the state of New South Wales and the federal courts of Australia and represent and advise the applicants in general legal matters.
2. After discussions with the applicants regarding their distributed stereo system I arranged a meeting with a patent attorney, Chris O'Sullivan who is a partner in the firm of FB Rice & Co Patent Attorneys. On 7 March 1997 I attended a meeting at the offices of FB Rice & Co. in Sydney with the applicants and Chris O'Sullivan at which time the applicants exhibited to me and Chris O'Sullivan the production prototype of their wall amplifier and showed how it fitted into a light switch housing and explained how it was hooked up to sound system components with category 5 cable to make their distributed stereo system as embodied in their patent application. My notes verify that the above meetings occurred on and prior to 7 March 1997.

All statements which I have made in this Declaration of my own knowledge are true, and all statements which I have made in this Declaration on information and belief are believed to be true. I have also been warned that willful false statements and the like are punishable by fine or imprisonment, or both under §1001 of Title 18 of the United States Code and may jeopardize the validity of this application or any patent issuing thereon.

Date: 31 JULY 2006


Jacquelyn Lee Israel



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DECLARATION of NIKOLA KORECKI UNDER 37 CFR 1.132

Nikola Korecki declares as follows:

1. I am a professional electronics engineer and have worked with a range of companies in Australia and overseas over the last fifteen years. I am currently in the employ of LeisureTech Electronics Pty Ltd and work together with the applicants. I am familiar with the distributed stereo system described in the applicants' patent application and with telephony systems in general terms.

2. The applicants' system is a stereo music system and is not analogous to a telephony/data system which is primarily intended for transport of narrow bandwidth voice as well as data communication signals. Technically, the levels of voltage and current required for transmission of audio signal and the bandwidth of transmitted audio signal for full stereo sound in an audio system are different from those specifications in a telephony/data system, typically differing by an order of magnitude. As telephony standards differ in various regulatory regimes the following data is presented as typical and indicative information for the purpose of comparison with the system embodied in the patent.

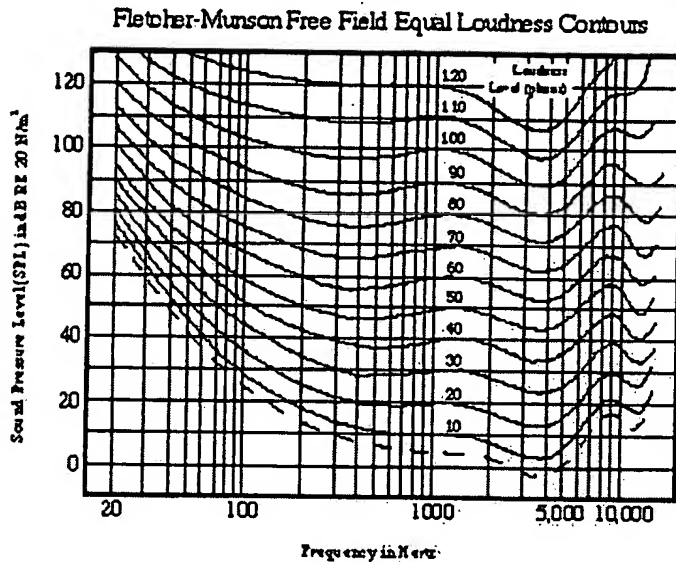
3. A telephony/data system is usually a twisted pair of No. 23 or No. 22 (AWG) copper wires. The following table summarizes various AWG properties.

AWG	Diameter	Diameter	Square	Resistance	Resistance
	mm	Inch	Mm2	ohm/km	ohm/1000feet
24	.51	0.02	0.20	87.5	27.3
22	.64	0.025	0.33	51.7	16.8
20	.81	0.032	0.50	34.1	10.5
18	1.02	0.04	0.82	21.9	6.8

Category 5 cable as used by the applicants' invention uses No. 24 AWG, such that No. 24 AWG has 1.6 times more resistance than typical No. 22 AWG wiring.

4. There is a marked difference in bandwidth required to support a telephony/data system and a full stereo system. In order to hear the full spectrum of music and voice from bass to soprano a music system requires vastly more bandwidth and more power than a telephony/data system. A telephone line (in the US and Europe) has a bandwidth of 3kHz. A normal POTS line can transfer the frequencies between 400 Hz and 3.4 kHz. The frequency response is limited by the telephone transmission system standards. The ear can hear sounds ranging from 20Hz to 20kHz. Ear sensitivity decreases significantly with lower frequencies, an important point. Through extensive empirical testing it has been clearly shown that the ear's response to a sound is proportionate, not to the absolute value of a stimulus, but to the ratio of the actual intensity of the sound to the threshold intensity. Further to this Fechner's law states that the relationship is a logarithmic not a linear one, that is the ear's response to increasing sound intensity is a "power of ten" or logarithmic relationship. As opposed to a measurable characteristic, loudness is a subjective term describing the strength of the ear's perception of a sound. It is intimately related to sound intensity but can by no means be considered identical to intensity. The sound intensity must be factored by the ear's sensitivity to the particular frequencies contained in the sound. A general 'rule of thumb' for loudness is that the power must be increased by about a factor of ten to sound twice as loud. Humans don't hear all frequencies of sound at the same level. That is,

our ears are more sensitive to some frequencies and less sensitive to other frequencies. Not only that, but the sensitivity also changes with the sound pressure level (SPL).

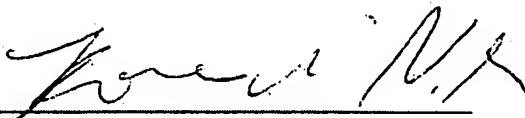


5. Music reproduction of frequencies down to 100Hz level is generally considered as a minimum requirement while 50Hz is desirable. At the lower frequencies, say 100Hz, for us to perceive 100Hz as loud as we do at the telephony lower limit at 400Hz (when the source is approximately at 10dB), the equivalent 100Hz source must be at 30dB – that is 20dB higher than the telephony lower limit at 400Hz signal! For a 50Hz signal to be perceived as loud as we do at the telephony lower limit at 400Hz (when the source is approximately at 10dB), the 50Hz source must be at 45dB – that is 35dB higher than the telephony lower limit at 400Hz signal! On this analysis 20dB is equivalent to 100 times increase in power requirement. This means that to reproduce music down to 100Hz as loud as at telephony band-limited case at 400Hz we need minimum 100 times more power, while to achieve same loudness level at 50 Hz compared to telephony lower bandwidth-limited case at 400Hz we will need 3,162 times increase in power requirement. Such power requirement to achieve audiophile quality of full room audio far exceeds the capability of the telephony/data system, where available current is limited at the PABX.

6. It follows that a music system as embodied in the patent significantly differs from a telephone/data system and therefore one having skill in the art of music systems would not look to telephony/data systems for guidance or inspiration. Each system serves vastly differing purposes using differing technologies to achieve different outcomes in a different market place.

All statements which I have made in this Declaration of my own knowledge are true, and all statements which we have made in this Declaration on information and belief are believed to be true. We have also been warned that willful false statements and the like are punishable by fine or imprisonment, or both under §1001 of Title 18 of the United States Code and may jeopardize the validity of this application or any patent issuing thereon.

Date: 15/AUG/2006



Nikola Korecki



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**DECLARATION OF ANDREW CHARTRES GOLDFINCH & LEONARD COLIN
ANDREWS UNDER 37 CFR 1.132**

Andrew Chartres Goldfinch and Leonard Colin Andrews-declare as follows:

1. We are the co-inventors of the distributed stereo system covered by the above-referenced United States patent application. Andrew Goldfinch has been in the audio industry for nearly 40 years and has been involved with multi-room audio systems for much of that time. Len Andrews has been working in the electronics field for 50 years and has collaborated with Andrew Goldfinch for the last 17 years.
- 2 In an interview on 13 June 2006, the Examiner sought an explanation as to how the system according to the invention overcame the problems that were predicted by others in the field to exist should category 5 cable be used to power a distributed music system. The purpose of this declaration is to explain how the system as embodied in the patent application simply avoided these problems by ignoring traditional presumptions about audio by taking an innovative and novel approach to achieve a multi-room audio solution.
3. Our system as embodied in the patent application is a distributed stereo music audio system using a Category 5 four pair twisted cable to carry audio signals and system power with status and data (with or without infrared) from a centralized power supply and source in one room to amplifiers and speakers in another room or remote location. The solution designed around the use of category 5 cable to power an audio system was not an obvious one. Our

invention did not come about as an evolution of traditional design but by taking a different and novel approach to the problems of multi-room audio. To a person skilled in the art the parameters applied by us would not be accepted as feasible and were not generally applied in the market place. It was not recognized that the twist in the cable would be good enough to shield the audio signal in long runs of cable and it was not recognized that the 8 cores in the category 5 cable enabled power, audio signal, status and data with or without infrared all to be carried within a single cable so making it a powerful solution to the existing problems with multi-room audio systems. The originality of our system as embodied in the patent brought about a major breakthrough in multi-room audio system design and eliminated many of the problems that existed with degraded sound quality in traditional multi-room audio systems. We have developed a greatly simplified method of installing multi-room audio and in doing so have opened up many new opportunities for an industry which was supplying cumbersome systems largely dependent on specialized personnel. The reasons why we took a different approach to those who taught against use of such cable for transmission of power are set out in the paragraphs below.

4. Andrew has been working with multi-room systems since the 1970's. His experience in sales and installation of such systems meant that he was very aware of customer demands and focused on finding audio solutions that provided optimum sound quality and performance in all the different room environments of a multi-room installation. Already by the late 1970's it had been observed that the quality and type of speaker cable made a noticeable difference to the quality of the sound from an audio system and an emerging market developed for audiophile speaker cables. Despite conjecture by some engineers who claimed they could not measure these differences in audio quality, we saw how the length, quality and type of speaker cable used impacted on sound quality and that such differences could be detected even over relatively short lengths of cable in a single room. Generally in a high quality system where separate pre/power amplifiers were used, sound quality could be maximized if short lengths of speaker cable were used with the power amplifiers positioned behind the speakers and then longer high impedance (line level) cables were used between the pre-amplifier and power amplifier. When it came to running longer lengths of speaker cable around a home the technical

problems increased with capacitance and resistance issues. Other less well understood problems such as amplifier damping also needed to be overcome. A speaker is at best 4% efficient and most of this energy is lost in the mass of the speaker diaphragm which is mounted like a spring. If a single note is generated, the diaphragm continues to move backwards and forwards on its suspension until the energy is lost. As a result it generates unwanted sounds which muffle the true signals generated by the amplifier. Using short cable lengths and an amplifier located close to the speakers can provide a higher dampening factor, such that these unwanted movements generate a reverse electrical current which the amplifier rejects and dampens. However, the longer the cable length, the less control the amplifier would have over this unwanted movement.

5. Other practical issues with installations of multi-room audio systems prior to our invention were finding a place to store a bulky amplifier in smaller rooms like bedrooms, kitchen or study. The compromise was long runs of speaker cable and an attenuator volume control in each room which often further degraded the sound quality. As the attenuator could only reduce the sound and not increase it, the main amplifier level controlled both speakers and the impedance load of multiple speakers affected the amplifiers performance and so also compromised the main speakers resulting in sonic loss. In situations where a dedicated amplifier was used they took up valuable space with the main system components. Controlling the source components is vital to multi-room audio and so traditionally 2 cables were required from the source components to each room, one being the speaker cable with quality related to its gauge and the other a data cable required to control the system by sending the infrared control data back from the remote room to the main source components. The bulk of the multiple cables meant they were cumbersome, difficult to install, unsightly and costly where audiophile quality cable was used.

6. Our company, LeisureTech, started manufacturing audio components in 1991. From the start, an audio system with distributed amplification was high on our list of research and development priorities. This was because we had learned from our experience as suppliers and installers of audio systems that if we could find a way to get the power from the control centre down the cable it would eliminate the need to use a local power source and if one power supply

could power multiple amplifiers, the cost of the system would be significantly reduced. Our development trials in the early 1990's were shelved due to technical difficulties with the cabling available at that time and concerns over legal and safety issues that resulted from running a high current power cable through a wall. In that period the notion that a single cable could carry out all of the operational functions for multi-room audio was not a consideration. Had we sought to develop such a cable at that time it would have been highly expensive to manufacture, bulky and difficult to install.

7. In March/April 1996 Andrew Goldfinch visited a number of trade shows in the US and became aware of category 5 cable. The category 5 cable had four core twisted pairs that could carry high speed data but looked completely different to an audio cable. The twist operated as a shield but not in the normal sense of a hot line with a negative used as shielding and as such it was not commonly recognized that the twist would operate as a way of shielding a cable particularly in a long cable run. Andrew Goldfinch was impressed by the properties of the category 5 cable and on his return to Australia, showed the cable to Len Andrews and we decided to revisit our earlier abandoned efforts with distributed amplification and explore connectivity with category 5 cable.

8. Having a background as an installer of high quality hi-fi rather than as an engineer, Andrew Goldfinch did not subscribe to the generally accepted view that getting the best performance out of a loudspeaker meant the more power the better and that the amount of volume was a good guide to quality. Rather it has always been his belief that it is more critical to get a system to perform well at low levels rather than high levels as often the music delivered through multi-room systems was used as a background to conversation and other domestic activities. It was a feature of most other systems available at the time of our invention that poor quality cable and long runs had the general effect of muddying the signal and in such cases users would increase the volume just to obtain a better level of clarity.

9. The aim of our invention was to deliver a high quality signal to every room and in doing so this would negate the need for higher power. Our starting point – and this was a significant

departure from the prior art in terms of not encountering the problems others having skill in the art predicted would arise if using category 5 cable to power a distributed audio system - was the recognition that a high powered system is of little merit if the sound quality is compromised. If the signal is compromised by the cable, it is usually difficult to upgrade the cable after installation and only limited improvement to the sound quality could be obtained by improving the quality of the speakers. With our system we found that once we were able to achieve a good quality signal of low power we could then enhance it through the use of good quality in-wall speakers that operated at power efficient levels. As a result we were able to develop a system where the amount of power was less critical and fitted within the capabilities of category 5 cable. This may seem a simple and basic approach but few engineers really understand the practicalities of audio delivery and instead subscribe to the long held the view that power output is a gauge of sound quality. It is because our approach departs from this view that the system according to the invention does not suffer from the problems prognosticated by those in the field who taught against the use of category 5 for carrying power in a distributed stereo system.

10. After our initial starting realization, one area to be considered was resistance on the line. Systems like IMP (Lonstein) were using standard 16 gauge speaker wire with a recommended minimum of 18 gauge. Category 5 cable is only 24 gauge and has four times the resistance of the standard 16 gauge cable. In a long cable length the voltage line resistance will reduce the current available and increasing the current will have the effect of increasing the resistance. We believe this to be why Lampen as late as in 1999 published papers arguing that category 5 cable was not suitable to carry power. Systems like IMP were used for commercial purposes where they were able to easily install booster power supplies down the line. However, our application was directed at the domestic market where finding a location for a power supply in each room was difficult and made installation complicated. A core feature of our distributed amplification system was to have the power supply centralized in a convenient point which was at the source or distribution point and so remove the need for local power supplies along the line.

11 Our invention came about as a result of a convergence of breakthroughs we made in several areas, which individually may have had little significance to how traditional multi-room

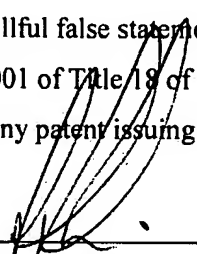
audio was constructed, however collectively they enabled us to devise a single cable distributed audio system. In other words, had we not conceived the idea of moving the amplifier from the central point into the room with the speakers which necessitated us first providing amplification compact enough to fit into a small space like a light switch box, while at the same time centralizing the power supply where it would be easy to connect to a power source and further enhance the value of the system by powering multiple amplifiers, we would not have been able to fit our distributed audio system within the limitations of category 5 cable. Our invention of a distributed audio system that used a single readily available cable was a significant breakthrough, as at the time of our invention the use of a single non-bulky cable capable of carrying all requirements for multi-room audio including infrared, data and power was not known, and the use of category 5 cable for this purpose had been expressly taught against by other experts in the field. The end result is such a simple solution it is easy to underrate the process taken to reach this outcome.

12 Our system that is the subject of this patent application, and marketed as “A-BUS” under more than 16 brands worldwide, is a truly elegant solution to multi-room audio. It uses one readily available low cost category 5 cable to each room that can be installed by a licensed electrician instead of a complicated wiring system requiring a person with considerable training to custom design a system. The amplifier which provides very high quality audio will fit into a light switch housing, so making installation much simpler and cheaper and also eliminating problems of finding a discreet location for these usually bulky components. By centralizing the power supply we are able to power up to six rooms so reducing the cost of multiple power supplies and allowing us to use a single off the shelf power supply without the need to complicate the system with power boosters along the line. The simplicity of the system means that installers who are also installing video distribution, phone and data can install the audio as well which compounds the already considerable efficiencies of this system.

13 Our understanding of audio and our innovative approach allowed us to work beyond the traditional assumptions about power and sound quality and devise a distributed audio system that simply avoids the traditional problems with multi-room audio. The result is a

systemic approach that is flexible, adaptable and accessible to the mass domestic market and has had a significant impact on the development of multi-room audio systems.

All statements which we have made in this Declaration of our own knowledge are true, and all statements which we have made in this Declaration on information and belief are believed to be true. We have also been warned that willful false statements and the like are punishable by fine or imprisonment, or both under §1001 of Title 18 of the United States Code and may jeopardize the validity of this application or any patent issuing thereon.

Date: 8th August 2006 
Andrew Goldfinch

Date: 8-8-06 
Leonard Andrews